Treaty establishing the EAEC — Annex I: Fields of research concerning nuclear energy referred to in Article 4 of this Treaty (Rome, 25 March 1957)

Caption: Signed on 25 March 1957 in Rome by the representatives of Belgium, the Federal Republic of Germany (FRG), France, Italy, Luxembourg and the Netherlands, the Treaty establishing the European Atomic Energy Community (EAEC or Euratom) sets out, in Annex I, the fields of nuclear research covered by the activities of the Euratom Commission.

Source: Treaty establishing the European Atomic Energy Community (EURATOM) and connected documents. Luxembourg: Publishing Services of the European Communities, [s.d.]. 222 p. "Annex I: Fields of research concerning nuclear energy referred to in Article 4 of this Treaty".

URL:
http://www.cvce.eu/obj/treaty_establishing_the_eaec_annex_i_fields_of_research_concerning_nuclear_energy_referred_to_in_article_4_of_this_treaty_rome_25_march_1957-en-ca054acd-3495-45c4-b0c4-1b2ab7316d33.html

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I . Raw materials

1. Methods for the prospecting and mining of base materials (uranium, thorium and other products of particular importance in the field of nuclear energy).

2. Methods of concentrating these materials and converting them into technically pure compounds.

3. Methods of converting these technically pure compounds into nuclear-grade compounds and metals.

4. Methods for the conversion and processing of these compounds and metals - as well as plutonium, uranium-235 or uranium-233, either pure or combined with such compounds or metals - into fuel elements by the chemical, ceramic or metallurgical industries.

5. Methods of protecting such fuel elements against corrosion or erosion by external agents.

6. Methods of producing, refining, processing and preserving other special materials used in the field of nuclear energy, in particular:

(a) moderators, such as heavy water, nuclear-grade graphite, beryllium and beryllium oxide;
(b) structural materials such as zirconium (hafnium-free), niobium, lanthanum, titanium, beryllium and their oxides, carbides and other compounds capable of being used in the field of nuclear energy;
(c) coolants, such as helium, organic liquids, sodium, sodium-potassium alloys, bismuth; lead-bismuth alloys.

7. Methods of isotope separation:
(a) of uranium;
(b) of materials in ponderable quantities which can be used in the production of nuclear energy, such as lithium-6, lithium-7, nitrogen-15 and boron-10;
(c) of isotopes used in small quantities for research.

II. Physics applied to nuclear energy

1. Applied theoretical physics:

(a) low-energy nuclear reactions, in particular neutron-induced reactions;
(b) fission;
(c) interaction of ionising radiation and photons with matter;
(d) solid state theory;
(e) study of fusion, with particular reference to the behaviour of an ionised plasma under the action of electromagnetic forces and to the thermodynamics of extremely high temperatures.

2. Applied experimental physics :

(a) the same subjects as those specified in 1 above;
(b) study of the properties of transuranic elements of importance in the field of nuclear energy.

3. Reactor calculations:

(a) theoretical macroscopic neutron physics;
(b) experimental neutron measurements; exponential and critical experiments;
(c) thermodynamic calculations and calculations of strength of materials;
(d) corresponding experimental measurements;
(e) reactor kinetics, reactor control problems and relevant experiments;
(f) radiation protection calculations and relevant experiments.

III. Physical chemistry of reactors

1. Study of changes in the physical and chemical structure and of alterations in the technical properties of various materials in reactors brought about by:

(a) heat;
(b) the nature of the agents with which they are in contact;
(c) mechanical factors.

2. Study of degradation and other phenomena produced by irradiation in:

(a) fuel elements;
(b) structural materials and coolants;
(c) moderators.

3. Application of analytical chemistry and analytical physical chemistry to reactor components.

4. Physical chemistry of homogeneous reactors: radiochemistry, corrosion.

IV. Processing of radioactive material

1. Methods of extracting plutonium and uranium-233 from irradiated fuels, and possible recovery of uranium or thorium.
2. Chemistry and metallurgy of plutonium.
3. Methods of extracting and chemistry of other transuranic elements.
4. Methods of extracting and chemistry of useful radioisotopes:

(a) fission products
(b) radioisotopes obtained by irradiation.

5. Concentration and storage of useless radioactive waste.

V. Applications of radioisotopes

Application of radioisotopes as active elements or tracers in:

(a) industry and science;
(b) medicine and biology;
(c) agriculture.

VI. Study of the harmful effects of radiation on living organisms

1. Study of the detection and measurement of harmful radiations.
2. Study of adequate preventive and protective measures and the appropriate safety standards.
3. Study of the treatment of radiation effects.

VII. Equipment

Studies relating to the construction and improvement of equipment specially intended not only for reactors but also for any of the industrial and research installations required for the research activities listed above. As examples may be mentioned:

1. The following types of mechanical equipment:

(a) pumps for special fluids;
(b) heat exchangers;
(c) apparatus for nuclear physics research, such as neutron velocity selectors;
(d) remote handling equipment.

2. The following types of electrical equipment:

(a) instruments for radiation detection and measurement, used particularly in:
- prospecting for minerals,
- scientific and technical research,
- reactor control,
- health and safety!
(b) reactor control equipment;
(c) low-energy particle accelerators (up to 10 MeV).

VIII. Economic aspects of energy production

1. Comparative studies, both theoretical and experimental, of the various reactor types.
2. Technical and economic study of fuel cycles.